Saskatchewan Energy and Mines

Saskatchewan Geological Survey

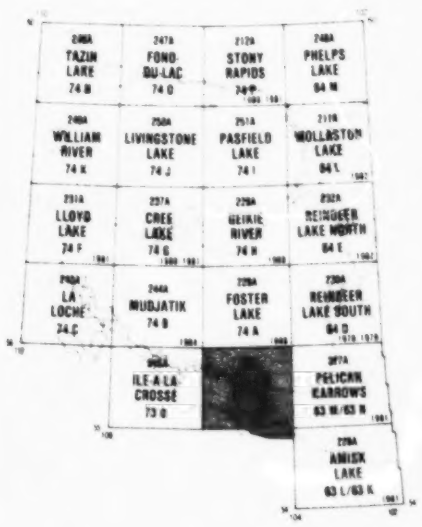
Report 225

Compilation Bedrock Geology Map Series:

Lac La Ronge, NTS Area 73P/73I

First Edition, 1985

Printed under the authority of the Minister of Energy and Mines


TAZIN LAKE 74 B
FOND-DU-LAC 74 G
STONY RAPIDS 74P
PHELPS LAKE 64 M
WILLIAM RIVER 74 K
LIVINGSTONE LAKE 74 J
PASFIELD LAKE 74 I
WOLLASTON LAKE 64 L
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Geological Notes

The Lac La Ronge map area is underlain by early Proterozoic crystalline basement rocks of parts of four lithotectonic domains of the 'Trans-Hudson Orogen', and a number of subdomains divided on the basis of difference in structural and/or lithological character (see inset map). These rocks have moderate to good exposure beneath a thin and sporadic Pleistocene glacial drift cover, except in a zone up to 18 km wide north of the Phanerozoic/Precambrian boundary where the drift is as much as 20 m thick (borehole D.M.R. Morin Lake 4-76, Lsd 10-4-71-25W2, in Fuzesy, 1980). The south is underlain by unmetamorphosed Phanerozoic sedimentary rocks covered by a blanket of drift as much as 85 m thick in places (borehole D.M.R. Morin Lake 11-77, Lsd 13-1-70-26W2, in Fuzesy, 1980). The Phanerozoic map is based largely on work by Fuzesy (1980), with additional information from borehole and diamond-drill hole data (Canadian Occidental Petroleum Ltd., 1978; Great Plains Development Co. of Canada Ltd., 1968, 1970).

Phanerozoic Rocks

To the west of Lac La Ronge, the Phanerozoic rocks consist of a lower clastic unit, a middle carbonate unit and an upper clastic unit, each separated by an erosional unconformity. The Meadow Lake Escarpment, just south of the map area, marks the southeast boundary of the carbonate unit. To the east of this only the two clastic units are present.

The **lower clastic unit** of the Cambrian Deadwood Formation rests nonconformably on relatively soft weathered Precambrian rocks. The unit consists of grey to brownish-grey glauconitic quartzose sandstones with minor shales and conglomerates (Fuzesy, 1980). Deposition occurred during the eastward transgression of Paleozoic seas onto the Precambrian surface (Fuzesy, 1980).

The **middle carbonate unit**, deposited in Middle Devonian supratidal and subtidal environments (Fuzesy, 1980), unconformably overlies either the Deadwood clastics or the Precambrian basement where the clastics are absent. The unit comprises lower and upper members of the Meadow Lake Formation. The Lower Member includes primarily grey to brown argillaceous and silty dolomites (Fuzesy, 1980). Simpson (1975) has suggested that a glacially disrupted outcrop on the south shore of Morin Lake is part of the Winnipegosis Formation, although it may belong to the Lower Member. The Upper Member, present only in the extreme southwest, comprises three distinct units of limestone, dolomite and mudstone (Fuzesy, 1980).

The **upper clastic unit** consists of lacustrine-fluvial, fluviomarine, and marine sandstones and shales of the Lower Cretaceous Mannville Group (Simpson, 1975). Several outcrops of sandstone containing small amounts of coal are exposed on the south shore of Wapawekka Lake (Langford, 1973).

Wollaston Domain

High-grade granite gneisses (*sensu stricto*) and granitoid gneisses (Wfn), minor metagabbro-metadiorite (Wbd) and amphibolite (Wm) of this domain are the only documented Archean basement in the map area. These units are unconformably overlain and tightly infolded with Aphebian supracrustal rocks of the 'Sandfly Lake Group' (Money, 1968) and Wollaston Group. The Sandfly Lake Group comprises biotite schists and gneisses (Wvn) of probable volcano-sedimentary origin and immature meta-arkosic psammites and metaconglomerates (Wm), which in the Needle Falls area locally comprise a thin basal continental to fluviatile sequence. These are unconformably overlain by mature, passive margin quartz-pebble metaconglomerates (Wry) and orthoquartzites, feldspathic quartzites and aluminous muscovite pelitic schists (Wq) of the Wollaston Group 'Meyers Lake-type' rocks (Money, 1968). Higher grade pelitic gneisses (Wpsn) occurring in this vicinity are probably also Aphebian but some may be Archean. Contacts between Archean basement and Aphebian cover are highly strained, with local tectonic elimination of parts of the cover succession. The granitic basement also contains local high strain zones parallel to the Needle Falls Shear Zone.

Rottenstone Domain

The **Wathaman Batholith** comprises coarsely megacrystic pink quartz monzonite-monzogranite and poorly to non-megacrystic pink-grey granite and granodiorite (Rgp). These are irregularly distributed, have complex locally gradational contacts, and cannot be consistently subdivided on the basis of available data. Much of the batholith is highly xenolithic and migmatitic. Zones incorporating large screens (possible roof pendants) and trains of hornblende gneiss-amphibolite and tonalite-migmatite country rock are generally characterized by inequigranular pegmatitic and aplitic phases of the batholith. Older, metasomatized and injected country rocks form an extensive and complex metasomatic aureole adjacent to the highly irregular eastern margin of the batholith and its sateilitic bodies. Most of the batholith is weakly to moderately foliated, but a westward gradation into strongly flasered and comminuted augen gneisses (Rgpx), and thence into laminated mylonitic gneisses, occurs over an interval of several hundred metres adjacent to the Needle Falls Shear Zone. Regular compositional banding in the laminated mylonites partly derives from tectonic attenuation and transposition of main phase megacrystic quartz monzonite, aplitic and pegmatitic sheets, and mafic xenoliths. Strongly flasered and refolded pink megacrystic-augened monzogranitic gneisses (Rnax) around Black Bear Island Lake may represent pre-Wathaman Hudsonian intrusives or Archean basement. However, similar highly strained rocks in the Besnard-Morning Lakes area (Rna) locally appear transitional to less deformed porphyritic granite-granodiorite of the Wathaman Batholith and may represent localised high-strain zones. Age relations in both areas are unresolved.

The **Tonalite-Migmatite Complex** comprises variably migmatized supracrustal gneisses (Rng) and subordinate, compositionally heterogeneous, plutonic bodies (Rgl and Rgt). The supracrustal paleosome is mostly psammitic to psammopelitic biotitic metagreywacke with subordinate pelites, hornblendic gneisses, amphibolites (Rm), calc-silicates and meta-arkoses, interpreted as arc-derived volcanogenic clastics and volcaniclastics. These are transitional to similar but generally less migmatized rocks of the La Ronge Domain, but contrast markedly with the Wollaston Group. Neosomal components include two suites: 1) a pre- to synkinematic suite of strongly foliated and folded quartz dioritic-tonalitic-trondjemitic-granodioritic gneisses together with less deformed later rocks of a similar compositional range (Rgt), and 2) a late synkinematic suite of pink leucogranites, pegmatites, and megacrystic and non-megacrystic monzogranites (Rgl) which are considered mostly coeval with the Wathaman Batholith but which may include components of at least two different ages. Both suites form elongate and folded intrusive bodies on all scales, as well as pervasive neosomes in the migmatitic gneisses.

The **Birch Rapids Straight Belt**, which forms the eastern part of the Tonalite-Migmatite Complex, is marked by regular strongly linear structural and aeromagnetic trends, and can be traced to the south under the Phanerozoic cover as a distinct aeromagnetic feature. This belt is lithologically similar to the remainder of the complex but has a high-strain planar kinematic fabric and transposed subparallel layering. Between Clam Lake and eastern Black Bear Island Lake it mainly comprises only mildly migmatized metagreywackes; minor hornblende gneisses; early, strongly foliated to mylonitic, granitic sheets; and a suite of later less foliated but highly boudinaged leucogranites and pegmatites. Protomylonite-mylonite zones occur locally. The straight belt is thought to have developed by both pure shear flattening and simple shear displacement. South of Trout Lake, the straight belt includes major bodies of flasered to mylonitic granite (e.g., Trout Lake Pluton), including Wathaman-type augened megacrystic monzogranite, which to the east passes transitionally into less deformed to massive equivalents (Lqm and undifferentiated parts of Lgn). From Mackintosh Lake northeastwards, the straight belt is intruded and supplanted by little-deformed and generally uniform pink biotite granodiorite-granite, as well as related pegmatite of the Hickson Lake Pluton.

La Ronge Domain

The **Central Metavolcanic Belt** features predominantly calc-alkaline to tholeiitic mafic to felsic metavolcanic rocks, proximal volcaniclastics and epiclastics, and interlayered volcanogenic metasediments intruded by granitic to ultramafic plutons. These rocks are of Early Proterozoic age (c. 1880 Ma; Van Schmus et al., 1985) and the belt is considered to be a subduction-generated island arc remnant. The metamorphic grade is low and the belt appears relatively less deformed than other parts of the domain. The belt is possibly allochthonous, forming a high-level tectonic slice structurally overlying the possible forearc assemblage of the MacLean Lake Belt to the southeast.

The **Crew Lake Belt** and **Nemeiben Zone** comprise predominantly biotitic pelitic to psammitic metagreywackes and other volcanogenic metasediments (Lsn). Acid volcanics and volcaniclastics are important locally, as are amphibolites, calc-silicate rocks and hornblende gneiss of probable volcanic origin (Lm), and polymictic metaconglomerates (Lon). A volcanic to sedimentary transition occurs northwestwards across the Crew Lake Belt. The Nemeiben Zone, which is part of the 'La Ronge Horseshoe' (Pearson, 1973), mainly comprises strongly foliated pre- to early synkinematic granodioritic-granitic gneisses (Lgn) interleaved with supracrustal rocks and complexly deformed by at least two postfoliation fold episodes. This early plutonic complex is characterized by predominantly biotitic rock types but includes extensive hornblende-bearing granodiorite-quartz diorite-tonalite, as well as undifferentiated large and small zones of quartz monzonite-granite (Lqm). Discrete, possibly later, plutons in the Nemeiben Zone include little-deformed to massive mafic-ultramafic bodies (Lbd and Lum) and quartz diorite-granodiorite (Lqd). Bodies of pink, commonly megacrystic, granite-quartz monzonite (Lqm) in this zone are similar in character and possibly age to the Wathaman Batholith and related bodies in the Rottenstone Domain.

The **plutons of the Central Metavolcanic and Crew Lake Belts** are generally composite, compositionally heterogeneous ovoid bodies. Many have an outer mafic quartz diorite-granodiorite zone which grades into or is intruded by a quartz monzonite-granite core. Most of the plutons are massive or only moderately foliated, except locally, and may be equivalent in age to late ovoid bodies in the Nemeiben Zone. Others, though little deformed, may be coeval with intensely foliated phases in the structurally lower and more deformed infrastructure of the Nemeiben Zone.

The **Nut Bay Belt** is lithologically similar and appears transitional to the Nemeiben Zone but has more strongly foliated biotitic and/or hornblendic granodioritic gneisses (Lgn). These are intercalated with subordinate supracrustals consisting predominantly of hornblende gneiss and amphibolite of metavolcanic or metavolcaniclastic derivation, with subordinate biotitic metasediments. Mafic-ultramafic plutons occur locally. Some of the fine-grained, strongly foliated and laminated amphibolites (Lmx), as in the Lynx, Sulphide and Hunt Lake areas, are strained derivatives of the mafic-ultramafic plutons. Mafic schists occurring elsewhere may be similarly derived.

The **MacLean Lake Belt** is mainly a mixed suite of psammitic to psammopelitic metagreywacke (LMsn), polymictic metaconglomerate (LMon) and hornblendic to amphibolitic gneisses (LMm), which may represent a telescoped forearc basin assemblage. They are structurally, and probably stratigraphically, overlain by

locally conglomeratic molasse-type meta-arkoses, granitoid meta-arkoses and derived granitic-pegmatitic neosome of the McLennan Group (LMr, LMrg), which are probably partly equivalent to the Sickle Group in Manitoba. The Haugen-MacKay-Hedben Lakes area includes abundant polymictic metaconglomerate which mostly contains volcanic as well as granitic clasts in a mafic greywacke-type matrix. The metaconglomerates are dominantly arkosic adjacent to the infolded outlier of the McLennan Group northeast of Hebden Lake and elsewhere. In the MacKay Lake area, quartz-eye granite porphyry sheets (LMg) intrude the metaconglomerates and also appear to provide detritus to some of the arkosic conglomerate units.

Apart from the albite-bearing Bridgeman Lake Pluton (LMga), felsic igneous rocks are a minor component of the MacLean Lake Belt, in contrast to the remainder of the La Ronge Domain. The supracrustal rocks are more highly migmatized in the northeast and much of the belt contains a high proportion of anatectic mobilizate. The MacLean Lake metagreywacke assemblage is probably at least in part coeval with lithologically similar rocks elsewhere in the La Ronge Domain.

The MacLean Lake Belt is intensely deformed: at least two fold-foliation forming events, accompanied by localized high-strain zones along fold limbs, produced the dominant northeasterly structural grain. A pervasive downdip-stretching lineation is characteristic. The belt is considered to comprise a series of fold-thrust packages associated with extreme crustal shortening. The McLennan Group is considered to occupy the core of a complex, overturned, isoclinal synform tectonically overridden by the older Central Metavolcanic Belt along the McLennan Tectonic Zone.

The **Meraste Zone** differs from the Nut Bay Belt and Nemeiben Zone in comprising generally more mafic and commonly richly hornblendic quartz diorite and granodiorite gneisses with abundant amphibolite and amphibolite migmatite, more akin to rocks within the Stanley Zone and adjacent parts of the Glennie Lake Domain. This is reflected in a distinctive aeromagnetic signature. The zone is gradational into the Stanley Shear Zone with increasing intensity of planar fabrics and increasing incidence of protomylonitic-mylonitic gneisses.

Strongly sheared fine-grained to mylonitic rocks (Lxt) occur near the boundary of the Meraste and Nut Bay Zones, but no well-defined tectonic discontinuity is evident, except in the north. Many of these highly strained rocks are derived from plutonic protoliths, while others may be supracrustal.

Glennie Lake Domain

The Glennie Lake Domain is characterized by complex arcuate to closed structural trends considered to be due to Type 1 and 2 fold interference of northerly (D_3) and northeasterly (D_4) large amplitude major folds. These deform flat-lying foliation and coeval isoclinal folds of two generations (D_1 and D_2), which are correlated with early fold-foliation forming episodes in the La Ronge Domain. In much of the Glennie Lake Domain, the late folds are relatively open and the early foliation is gently dipping. In the southwest, a change in gross structural style from the La Ronge Domain roughly coincides with the Stanley Shear Zone discontinuity. Northeast of Guncoat Bay, there is a lithological and structural transition between the steeply dipping Nut Bay and MacLean Lake Belts and the Wapassini Allochthon of the Glennie Lake Domain, where the northeast continuation of the late brittle Stanley Fault system forms an arbitrary domain boundary.

The **Wapassini Allochthon** structurally overlies and includes refolded parts of the Guncoat Gneisses (Gxg) east of the Stanley Shear Zone. It is considered to be a major allochthonous tectonic package (nappe), rooted in the Nut Bay and MacLean Lake Belts, which incorporates highly appressed, complexly refolded isoclines and formerly flat-lying foliation. The allochthon comprises mixed psammitic to pelitic metagreywackes, minor metaconglomerates, layered to homogeneous metavolcanics, volcaniclastics and calc-silicates equivalent to those in the Nut Bay and MacLean Lake Belts. Minor ultramafic and metagabbroic bodies occur locally. Associated quartz dioritic to granitic orthogneisses (Ggn) resemble those of the Nut Bay Belt (Lgn) but are commonly less homogeneous and more migmatitic; an unknown proportion may be reconstituted from supracrustal rather than plutonic protoliths.

The Guncoat Gneisses, which form the sole of the Wapassini Allochthon, are mylonitic rocks and tectonic schists considered to be derived from earlier psammopelitic diatexites, and to a lesser extent from plutonic protoliths subsequently recrystallized at high grade. They are considered to be the main component of an early-tectonic high strain zone which forms the sole or lower detachment zone of the Wapassini Allochthon.

The **Iskwatikan Subdomain**, which structurally underlies the Guncoat Gneisses sole, mainly comprises variable, well-foliated and commonly migmatitic hornblende and/or biotite quartz diorite, tonalite, granodiorite and granite orthogneisses (Ggl and Gdl). Hornblende gneiss and fine- to coarse-grained amphibolite paleosome remnants range from isolated schlieren to major semicontinuous migmatitic and nonmigmatitic zones (Gm). Also occurring are later minor to abundant injections or bodies of biotite-bearing megacrystic quartz monzonite, granite (Gqm), and equigranular leucogranite and pegmatite of several possible ages. These range from relatively uniform massive to intensely foliated. The indicated lithological distinction between units Ggl, Gdl and grossly similar orthogneisses of the La Ronge Domain (Lgn) and Wapassini Allochton (Ggn) is of doubtful validity, except that the latter are at a higher structural level. Unit Gdl includes rocks generally described as relatively homogeneous hornblende-bearing quartz diorite and granodiorite-tonalite plutonics, as well as local quartz

monzonite-granite and complex migmatitic zones. Unit Ggl is generally lithologically more varied, inhomogeneous and dominantly biotitic, and may include components older than unit Ggl. In places, as for example immediately north and south of Wapawekka Lake, the unit includes abundant later homogenous plutonic biotite/hornblende granodiorite (Ggd), quartz monzonite and granite (Gqm).

Highly strained, protomylonitic and blastomylonitic rocks of the Nistowiak and Hunter Bay gneisses (Gxn and Gxh) are largely derived from varied metaplutonic and migmatitic protoliths. These include mafic to mesocratic quartz diorite-tonalite-granodiorite, mesocratic to leucocratic pink megacrystic and non-megacrystic granite-quartz monzonite, leucogranite and pegmatite and local heterogeneous migmatites comprising psammitic to pelitic paleosome and plagioclase-porphyroblastic tonalite neosome. These gneisses are strongly foliated, 'beaded', augened and banded/laminated, and are similar in character to the Guncoat Gneisses, but dissimilar insofar as most are considered to have plutonic protoliths. Conversely some areas designated biotitic gneisses (Gsn) in the Iskwatikan Subdomain may also be tectonically derived rocks similar to the Guncoat, Nistowiak and Hunter Bay gneisses.

Basic to intermediate metavolcanics (Gvb), intermediate to acid pyroclastics and epiclastics (Gve), and commonly conglomeratic meta-arkoses of the Wapawekka Lake area are generally at lower metamorphic grade and apparently less highly deformed than in the remainder of the Glennie Lake Domain.

Economic Geology

In recent years, mineral exploration in the Lac La Ronge map area has been concentrated on gold, primarily in the Central Metavolcanic Belt (particularly around Star Lake and also in the Sulphide Lake area). Both vein- and stratiform-type gold occurrences are present, with vein-type deposits more common in the Star Lake area and stratiform-type deposits predominant in the Sulphide Lake area. Vein-type deposits in the Star Lake area have recently comprised the more advanced exploration and development stages of gold prospects. Most of the gold showings occur in or adjacent to the Star Lake Pluton. The joint **Starrex/SMDC 21 zone** is planned to go into production in mid-1987 with a 200 t/day mill. The 21 zone mineralization, which has preliminary drill-indicated reserves of 209 300 t at 17.14 g/t Au (Thomas, 1984), occurs in a dilative zone within steeply dipping northeast-trending shear zones cutting monzonites of the Star Lake Pluton. Numerous mafic to felsic dykes are broadly conformable to the shear zone and, along with the plutonic rocks in the area, range from moderately foliated, cataclastic and protomylonitic to mylonitic. The mineralized zone of relatively massive, undeformed quartz and euhedral pyrite has a strike length of 80 m and depth of 130 m, with a moderate to steep southwest plunge.

The **Kahn 18 vein**, less than 200 m south of the 21 zone in the original discovery area, is being evaluated as a possible supplement to the 21 zone production. Mineralization is contained in a sheared ('ribbon') quartz vein that infills a northeast-trending shear fracture cutting monzonites of the Star Lake Pluton. The wall rocks are epidotized and hematized and the greatest concentration of gold tends to be towards the footwall side of the vein. The zone has been traced along strike for 250 m and drilling has intersected 41.8 g/t Au over 0.5 m (Thomas, 1984).

The **Rush Lake (Pie claims) zone** is also undergoing evaluation as a 21 zone production supplement. The main area of mineralization is in a 1 to 3 m wide, massive, white to grey quartz vein that is roughly conformable to a northeast-trending shear zone which dips steeply to the southeast. The shear zone can be traced up to 3 km along strike, predominantly through diorites of the Star Lake Pluton. Mineralization includes pyrite, chalcopyrite and visible gold which is associated with chlorite-rich seams. In 1970 a small operation crushed 20 tons of ore from the main pit area. Drilling has indicated an ore zone with a strike length of 60.9 m, width of 1.2 m and depth of 30.5 m and containing reserves of 5 763 t grading 13.03 g/t Au (Thomas, 1984).

The **Tamar showing** occurs in a 4.5 to 24 m wide northeast-trending shear zone that has been traced for 430 m along the contact between metavolcanics to the west and diorites of the Star Lake Pluton to the east. Mineralization exists in pyritized quartz veins and lenses within the commonly chloritized and carbonatized rocks of the shear zone. Composite chip samples assayed 2.7 g/t Au and 0.7 g/t Ag over 0.9 m (Thomas, 1984).

In the **Sulphide Lake area**, mineralization is predominantly characterized by stratiform-type gold occurrences comprising early concordant quartz-sulphide veins within shear zones. The shear zones cut felsic volcanic-volcaniclastic sedimentary sequences and related subvolcanic porphyritic intrusives and sill-like gabbroic intrusives. The concordant mineralization is associated with carbonaceous 'lean' sulphide-facies iron formation argillites. The more limited discordant mineralization comprises tension fracture-fillings and axial plane fracture-fillings. The Studer A and C zones are the most significant gold occurrences in the Sulphide Lake area. Concordant mineralization at the A zone includes gold, arsenopyrite, pyrite, pyrrhotite and minor chalcopyrite in quartz veins and lenses associated with easterly trending shears. Drilling of the A zone indicated a 2.4 m wide and 230 m long zone reaching a depth of 230 m with estimated reserves of 160,000 tons grading 0.22 oz./ton Au (SMDI 73-P-7-SW Au-10)[1]. The Studer C zone comprises irregular quartz veins and stockworks within highly deformed felsic volcaniclastics with essentially no iron formation present. Mineralization includes gold,

[1]Saskatchewan Mineral Deposits Index, Saskatchewan Energy and Mines, Regina.

arsenopyrite, pyrite and rare galena in quartz veins that occur both parallel to the earlier foliation and along later axial plane fractures of northerly plunging folds. Drilling indicated reserves of 18,000 tons averaging 0.4 oz./ton Au (SMDI 23-P-7-SW Au-10) from three parallel zones in an area measuring 60 by 45 m.

Northeast of Sulphide Lake, the **Preview Lake North and South zones** are associated with sheared gabbroic sills that intrude felsic volcanic-volcaniclastic rocks. The North zone comprises pyrite, arsenopyrite and rare chalcopyrite disseminations and veinlets in quartz veins and adjacent wall rocks along a sheared contact between a gabbroic sill and felsic volcaniclastics. Trenching and drilling outlined two *en echelon* mineralized zones with a combined potential of 250 tons per vertical foot at a grade of 0.35 oz./ton Au (SMDI 73-P-7-NW AU-1). Approximately 700 m to the southwest, the South zone is characterized by arsenopyrite, pyrite and rare chalcopyrite mineralization in northeast-trending concordant quartz veins within a sheared gabbroic sill. Trenching indicated a potential of 130 tons per vertical foot at a grade of 0.5 oz./ton Au (SMDI 73-P-7-NW Au-1).

As the gold play is currently very active, more up-to-date and comprehensive accounts of the mineralization will be found elsewhere.

In addition to gold mineralization, the Lac La Ronge map area contains several disseminated sulphide occurrences with significant Cu and Ni values, plus one past-producing mine. The Anglo-Rouyn mine and the Elizabeth Lake, Nemeiben Lake, Howard Lake and Gochager Lake occurrences all occur in the La Ronge Domain. The **Anglo-Rouyn copper mine** commenced mining operations in 1966 with estimated reserves of 2 million tons averaging 2.4 percent Cu and ceased operations in 1972 with a final production of 62,227,107 lbs. of Cu, 67,622 oz. of Au and 309,600 oz. of Ag (SMDI 73-P-6-SE Cu-1). The sulphide ore occurs as lenticular zones up to 30 feet wide, located primarily in biotitic metasedimentary rocks in close contact with granitic intrusives. The *en echelon*, doubly plunging ore zones consist of stringers and ramifying veins of quartz up to 3 m wide with associated pyrite, pyrrhotite and chalcopyrite veins up to 0.7 m wide. The mineralization was deposited by fracture-filling and limited partial replacement along a northeast-trending fault zone. The ore probably originated from 'metamorphic-hydrothermal' solutions derived from the granitic magma or adjacent metasediments.

The **Elizabeth Lake deposit** contains disseminated and veined chalcopyrite, pyrite, pyrrhotite and magnetite with drill-indicated reserves of 6,700,000 tons grading 1.5 percent Cu (SMDI 73-P-6-SW Cu-2). The lenticular zones of mineralization, which are similar to those found at the Anglo-Rouyn mine, occur along fracture zones in a north-northeast- trending metasedimentary gneiss belt that is locally intruded by gabbro, quartz diorite and granite. This is the same belt of metasediments in which the Anglo-Rouyn deposit is located. The disseminated sulphides have a possible syngenetic origin, while the veins probably originated from hydrothermal solutions concentrated along fracture zones by fracture-filling and partial replacement.

The **Nemeiben Lake Ni-Cu deposit** comprises an east zone with a 1973 estimate of 2,273,975 probable tons grading 0.61 percent Ni and 0.38 percent Cu with an additional 1,325,280 possible tons and open pit ore of 5,476,000 tons at 0.34 percent Ni and 0.18 percent Cu as well as a west zone with open pit estimates of 1,000,000 tons grading 1.55 percent Cu (SMDI 73-P-6-SE Ni-2). The disjointed vein and disseminated sulphide mineralization, which occurs in sheared areas of an ultramafic complex, comprises an earlier nickeliferous pyrrhotite, pyrite, chalcopyrite and rare pentlandite mineralization and a later mineralization consisting of native copper, specular hematite and secondary copper minerals. The sulphide-rich veins resulted from fracture-fill and replacement deposition. The disseminated sulphides probably originated from late magmatic crystallization with local remobilization of sulphides along shear zones.

At the north end of **Howard Lake**, disseminated pyrite, pyrrhotite, chalcopyrite and pentlandite mineralization has estimated reserves of 60,000 tons grading 1.03 percent Ni, 0.44 percent Cu and 0.044 percent Co (SMDI 73-P-5-SE Ni-1). The mineralization exists in a narrow hornblende quartz diorite-gabbro-ultramafic complex within a biotite quartz diorite-biotite gneiss migmatite.

The **Gochager Lake Ni-Cu prospect** consists of extensive rusty zones containing pyrrhotite, pyrite, chalcopyrite and bornite mineralization with estimated reserves of 4,262,400 tons grading 0.295 percent Ni and 0.081 percent Cu mineable by open pit methods, plus an additional 876,200 tons grading 0.389 percent Ni and 0.093 percent Cu mineable by underground methods (SMDI 73-P-15-SW Ni-1). The mineralization occurs as massive pods, disseminated blebs and fracture-filled veins within the gabbroic and hornblendite rocks of a small mafic plug intruding the surrounding metasediments.

The **Pitching Lake Cu prospect**, located in the Glennie Lake Domain, is to date the only significant mineralized occurrence outside the La Ronge Domain. It comprises three mineralized zones, consisting of disseminated pyrite, pyrrhotite and minor chalcopyrite, that occur along shear zones within hornblende gneisses containing lenses and layers of calc-silicate gneiss. The A zone, with indicated reserves of 100,000 tons grading 2.6 percent Cu (SMDI 73-P-8-NE Cu-1), has a surface gossan that forms the top of an irregularly shaped Cu-bearing ore shoot. A shaft was sunk to a depth of 42 feet at the southwest end of the A zone. The B and C zones are located 1 and 2 miles northeast of the A zone respectively. Both of these zones contain low-grade copper mineralization; an exploration adit to test the mineralization beneath the B zone reached 235 feet with no significant results. Mineralization was

probably derived from syngenetic sulphides that were remobilized during a period of metamorphism and concentrated along sheared and brecciated fault zones.

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Saskatchewan Energy and Mines

Saskatchewan Geological Survey

Map

LAC L

Kilo

M

106 00 — 50000mE — 45

50 00

LEGEND

QUATERNARY

UPS — **Unexposed Precambrian Shield:** Pleistocene glacial drift

~~~~~~~~~~ UNCONFORMITY ~~~~~~~~~~

LOWER CRETACEOUS

Km — **Mannville Group:** white to light grey, kaolinitic, quartzose sands and sandstones of fluviatile, deltaic and marine origin; local grey to black, carbonaceous and lignitic, sandy mudstones and lignite

~~~~~~~~~~ UNCONFORMITY ~~~~~~~~~~

MIDDLE DEVONIAN

ELK POINT GROUP

Meadow Lake Formation

Dmu — **Upper Member:** comprising a lowermost laminated limestone unit, a middle argillaceous dolomite unit and an upper dolomitic mudstone unit; *present only in subcrop*

Dml — **Lower Member:** light grey to brown, argillaceous and silty dolomite with common mudstone interbeds and local sandstone and limestone interbeds; local gypsum bands and veins

~~~~~~~~~~ UNCONFORMITY ~~~~~~~~~~

CAMBRIAN

Cd — **Deadwood Formation:** light grey to light brownish-grey, fine to very coarse, commonly glauconitic, feldspathic, quartzose sandstone; *present only in subcrop*

~~~~~~~~~~ UNCONFORMITY ~~~~~~~~~~

LATE APHEBIAN (HUDSONIAN')

Mylonitic gneisses of the Needle Falls Shear Zone; laminated to blastomylonitic; derived from rocks of the Wathaman Batholith and Wollaston Domain

Granitic pegmatite: buff to pink, medium to coarse grained, massive to weakly foliated, predominantly microcline rich

WOLLASTON DOMAIN

APHEBIAN AND PROBABLE APHEBIAN

Wollaston Group

Wpx — **Migmatized supracrustal rocks or flasered granitoid basement**

Pelitic and psammopelitic gneisses: ± garnet ± sillimanite ± cordierite ± graphite

'Meyers Lake-type' rocks (Money, 1968)

Wq — **Orthoquartzite and feldspathic quartzite:** locally calcareous, including subordinate intercalated pelitic muscovite schists and quartz-pebble metaconglomerates

LA RONGE DOMAIN

HUDSONIAN

Lx — **Tectonic schists and gneisses**

Lxg: ('Guncoat Gneisses') - plagioclase-augen biotitic tectonic schists, protomylonitic and mylonitic gneisses, mostly derived by intense strain of precursor migmatite and diatexite, continuous with unit Gxg of the Glennie Lake Domain

Lxt: tectonic schists and mylonitic rocks of debatable origin, possibly biotitic supracrustals and/or mylonitized plutonic and migmatitic gneisses

PROBABLE 'HUDSONIAN' PLUTONIC ROCKS

GLENNIE LAKE DOMAIN

PROBABLY HUDSONIAN/APHEBIAN

Gx — **'Tectonized' Rocks:** intensely flasered, protomylonitic and mylonitic gneisses, cataclasites, tectonic schists and related rocks; mostly early syntectonic and recrystallized

Gxg: ('Guncoat Gneisses') - primarily porphyroclastic plagioclase-augen biotite schists and gneisses derived from migmatized psammopelitic metasediments and derived 'diatexite' melt protoliths, with minor blastomylonitic gneisses derived from varied plutonic protoliths

Gxn: ('Nistowiak Gneisses'), Gxh ('Hunter Bay Gneisses') - primarily derived from varied megacrystic and nonmegacrystic, quartz dioritic to granitic protoliths; subordinate porphyroclastic plagioclase-biotite

Map 225A. COMPILATION BEDROCK GEOLOGY SERIES

LAC LA RONGE, NTS AREA 73P/73I

SASKATCHEWAN

Scale 1:250 000

Kilometres 6 0 6 12 18 Kilometres

Miles 4 0 4 8 12 Miles

106 00 4 450000m E. 45 6 30 7 8 15 9 105 00 1 45 2 3 30

56 00

6200000m N

9

8

45

7

6

GLENNIE LAKE DOMAIN

SONIAN/APHEBIAN

ized Rocks: intensely flasered, protomylonitic and itic gneisses, cataclasites, tectonic schists and d rocks; mostly early syntectonic and recrystallized

'Guncoat Gneisses') - primarily porphyroclastic plagioclase-augen biotite schists and gneisses derived from migmatized psammopelitic metasediments and derived 'diatexite' melt protoliths, with minor blastomylonitic gneisses derived from varied plutonic protoliths

'Nistowiak Gneisses'), Gxh ('Hunter Bay Gneisses') - primarily derived from varied megacrystic and nonmegacrystic, quartz dioritic to granitic protoliths; subordinate porphyroclastic plagioclase-biotite gneisses of 'Guncoat type'; may include supracrustal

Keith Lake

McIntosh Lake

Nipew Lake

Missinipe

Lac La Ronge

Herburn Lake

Y SERIES

73P/731

8 Kilometres

12 Miles

FIRST EDITION, 1985

SYMBOLS

- Phanerozoic bedrock exposure
- Geological contact
- Structural lineament, possible fault, interpreted from geological, geophysical and/or airphoto evidence
- Inferred thrust fault (see Lewry, 1983)
- Structural trend lines interpreted from airphotos and structural orientation data: dip shallow (0°-29°), moderate (30°-59°), steep (60°-84°), subvertical (85°-90°)
- Projected sub-Phanerozoic structure trend lines interpreted from aeromagnetic data
- Approximate to inferred northeasterly subcrop limit of Phanerozoic strata
- Upper Member, Meadow Lake Formation
- Lower Member, Meadow Lake Formation
- Deadwood Formation
- 826 / 72 — Phanerozoic borehole location, diamond-drill hole location with depth to Precambrian basement in metres
- Mineral Prospect
  1. Star Lake, "21 zone" and "Kahn 18 vein", Au (Thomas, 1984; Coombe, 1984)
  2. Rush Lake, "Pie claims", Au (Thomas, 1984; Coombe, 1984)
  3. Tamar Showing, Au (Thomas, 1984; Coombe, 1984)
  4. Sulphide Lake, Au (As, Zn, Pb, Cu) (Beck, 1959; Forsythe, 1971a; Sibbald, 1984; Coombe, 1984)
  5. Preview Lake North and South Zones, Au (Beck, 1959; Forsythe, 1971a; Coombe, 1984)
  6. Anglo-Rouyn Mine, Cu (Zn, Pb, Mo, Au, Ag) (Beck, 1959; Forsythe, 1971a; Forsythe, 1972b)
  7. Elizabeth Lake, Cu (Zn, Au, Pb) (Forsythe, 1976)
  8. Nemeiben Lake, Ni, Cu (Cr, Co) (Beck, 1959; Forsythe, 1971a)
  9. Howard (Little Clam) Lake, Ni, Cu, Co (Forsythe, 1972a)
  10. Gochager Lake Prospect, Ni-Cu (Co) (Pearson and Froese, 1959; Coombe, 1975)
  11. Pitching Lake Prospect, Cu (Beck, 1959; Morris, 1962)
- (A) — Sample Location (geochronology):
  1. 1877 ± 8 Ma, U-Pb zircon (Van Schmus et al., 1985)
  2. 1879 ± 66 Ma, U-Pb zircon (Van Schmus et al., 1985)
  3. 1659 ± 110 Ma, K-Ar hornblende (Wanless et al., 1974)
  4. 1710 Ma, K-Ar muscovite (Lowdon, 1961)
  5. 1854 ± 100 Ma, Rb-Sr whole rock isochron (Watters and Armstrong, 1984); location is approximate centre of collecting area
  6. 1720 Ma, Pb-Pb galena (Sangster, 1978); different ages result from using differing Pb decay models
  7. 1780 ± 90 Ma, K-Ar muscovite; 1820 ± 90 Ma, K-Ar biotite (Money, 1968)
  8. 1730 ± 90 Ma, K-Ar muscovite (Money, 1968); 1990 Ma, Rb-Sr whole rock isochron (Money, 1967)
  9. 1570 ± 80 Ma, K-Ar biotite (Money, 1968)
  10. 1740 ± 90 Ma, K-Ar biotite; 1880 ± 90 Ma, K-Ar hornblende (Money, 1968)

WOLLASTON DOMAIN

APHEBIAN AND PROBABLE APHEBIAN

Wollaston Group

Wpx — **Migmatized supracrustal rocks or flasered granitoid basement**

Pelitic and psammopelitic gneisses: ± garnet ± sillimanite ± cordierite ± graphite

'Meyers Lake-type' rocks (Money, 1968)

Wq — **Orthoquartzite and feldspathic quartzite:** locally calcareous, including subordinate intercalated pelitic muscovite schists and quartz-pebble metaconglomerates

Wry — **Arkosic and quartz-pebble metaconglomerate**

Probably Pre-Wollaston Group ('Sandfly Lake Group' of Money, 1968)

War — **Meta-arkose and pebbly meta-arkose**, including polymict metaconglomerate

Biotite schists and gneisses: medium grained, mesocratic, usually with more than 20 percent biotite + plagioclase + hornblende ± pyroxene ± magnetite ± quartz; probable volcano-sedimentary origin

ARCHEAN, DEFORMED AND METAMORPHOSED DURING THE HUDSONIAN

Hornblende gneiss-amphibolite: derived from metadiorite-metagabbro unit Wbd

Wbd — **Metadiorite-metagabbro**

Syenogranitic to granodioritic gneisses: biotitic ± hornblende, locally megacrystic, intensely flasered locally, especially adjacent to Needle Falls Shear Zone

Wfm: abundant interlayered amphibolite, possibly related to unit Wvn

ROTTENSTONE DOMAIN

HUDSONIAN

Wathaman Batholith

Monzogranite-granodiorite: K-feldspar megacrystic to non-megacrystic, + biotite ± hornblende, medium to coarse grained, massive to foliated, locally containing abundant xenoliths and schlieren of amphibolite and hornblende gneiss

Augen gneisses: intensely flasered to protomylonitic, derived from rocks of the Wathaman Batholith adjacent to the Needle Falls Shear Zone

Mixed rocks: weakly foliated rocks of the Wathaman Batholith (unit Rgp) and flasered augen gneisses (unit

LATE APHEBIAN (HUDSONIAN¹)

Mylonitic gneisses of the Needle Falls Shear Zone: laminated to blastomylonitic, derived from rocks of the Wathaman Batholith and Wollaston Domain

Granitic pegmatite: buff to pink, medium to coarse grained, massive to weakly foliated, predominantly microcline rich

LA RONGE DOMAIN

HUDSONIAN

Lx — **Tectonic schists and gneisses**

Lxg: ('Guncoat Gneisses') - plagioclase-augen biotitic tectonic schists, protomylonitic and mylonitic gneisses, mostly derived by intense strain of precursor migmatite and diatexite, continuous with unit Gxg of the Glennie Lake Domain

Lxt: tectonic schists and mylonitic rocks of debatable origin, possibly biotitic supracrustals and/or mylonitized plutonic and migmatitic gneisses

PROBABLE 'HUDSONIAN' PLUTONIC ROCKS

Lqm — **Quartz monzonite-monzogranite-(granodiorite):** medium to coarse grained, equigranular to megacrystic, equivalent to and probably approximately coeval with units Rgp and Rgl

Lqmx: strongly flasered augen gneiss derived from megacrystic quartz monzonite-granite

Lqd — **Quartz diorite-granodiorite-quartz monzonite-granite:** predominantly granodioritic, including relatively homogeneous simple plutons and more complex zoned intrusions in the Central Metavolcanic Belt, may include parts of units Lqm and Lqd

Lqd — **Diorite-quartz diorite-(granodiorite):** medium to coarse grained, massive to well foliated, + hornblende ± biotite

Lqdp: porphyritic with feldspar phenocrysts up to 10 mm in diameter

Gabbro-(diorite)

Ultramafic rocks: peridotite, pyroxenite, metagabbro and metamorphosed equivalents (coarse-grained amphibolites, etc.)

Lgn — **Granodiorite-granite complex:** strongly foliated and refolded, predominantly biotitic ± hornblende but locally including hornblende granodiorite-quartz diorite gneiss, mostly plutonic but includes local migmatitic and anatectic components derived from units Lsn and Lm; possibly in large part older than units Lbd, Lqd, Lgd, Lqm (but including these locally) and probably mainly equivalent to, as well as continuous, with unit Ggn in the Wapassini Allochthon, Glennie Lake Domain

Lgdn — **Hornblende quartz diorite to granodiorite gneisses** of the Meraste Zone: locally with abundant amphibolite schlieren and later pink granite/pegmatite neosome; generally more mafic than unit Lgn

PROBABLY APHEBIAN

Amphibolite, hornblende gneiss and schist, with minor calc-silicate gneiss; mainly derived from basic volcanics and volcaniclastics; includes migmatitic rocks with abundant paleosome of unit Lm

Lmx: intensely foliated and laminated derivations of mafic-ultramafic plutons

Basic-intermediate metavolcanics: metalavas, agglomerates, tuffs, epiclastics and proximal volcanogenic metagreywackes; local acid volcanics (unit Lva) and pelitic metasediments (unit Lsn)

Acid to intermediate metavolcanics: metarhyolite, metadacite

Volcanic-volcaniclastic-epiclastic rocks: includes unit Lvb widely intercalated with epiclastic rocks, metagreywackes and metasediments; gradational to unit Lsn/Msn in places

Biotitic metasediments: psammitic to pelitic gneiss and schist, ± muscovite ± garnet ± sillimanite ± graphite ±

GLENNIE LAKE DOMAIN

PROBABLY HUDSONIAN/APHEBIAN

Gx — **'Tectonized' Rocks:** intensely flasered, protomylonitic and mylonitic gneisses, cataclasites, tectonic schists and related rocks; mostly early syntectonic and recrystallized

Gxg: ('Guncoat Gneisses') - primarily porphyroclastic plagioclase-augen biotite schists and gneisses derived from migmatized psammopelitic metasediments and derived 'diatexite' melt protoliths, with minor blastomylonitic gneisses derived from varied plutonic protoliths

Gxn: ('Nistowiak Gneisses'), Gxh ('Hunter Bay Gneisses') - primarily derived from varied megacrystic and nonmegacrystic, quartz dioritic to granitic protoliths; subordinate porphyroclastic plagioclase-biotite gneisses of 'Guncoat type'; may include supracrustal gneisses and schists locally

Gqm — **Quartz monzonite and granite:** locally megacrystic, massive to strongly foliated plutonic rocks

Ggd — **Granodiorite, minor quartz diorite, quartz monzonite:** weakly to strongly foliated plutonic rocks

Gqd — **Diorite, quartz diorite**

Gabbro-diorite

Ggn — **Strongly foliated and refolded granodioritic-granitic gneisses of the Wapassini Allochthon:** continuous with unit Lgn of the La Ronge Domain, and probably including extensive areas of 'granitized'/reconstituted supracrustal and plutonic rocks

Gdl — **Quartz diorite-tonalite to granodiorite gneisses of the Iskwatikan subdomain:** generally more hornblendic than units Ggl and Ggn, but distinction is commonly obscure; zones of amphibolitic migmatite, and later monzogranite bodies; locally widely injected by pink granitic neosome

Ggl — **Granitoids of the Iskwatikan subdomain:** granodioritic-granitic gneisses, generally more biotitic than unit Gdl but locally including units Gdl, Gqm and Ggd, broadly similar to Lgn and Ggn at lower structural level

Gm — **'Hornblende migmatite':** agmatite with paleosome of unit Gm, represented as schlieric granodiorite in many localities

Marble and calc-silicate rock, possibly locally including altered and deformed ultramafic rocks

Mafic to mafelsic rocks: amphibolite, hornblende gneiss, mafic to mafelsic supracrustals ± calc-silicate rocks, probably in large part derived from basic-intermediate volcanics

Metavolcanic rocks: mainly basalt-andesite lavas, agglomerates, and tuffs

Gvn: gneissic equivalents

Gve — **Acid to intermediate volcaniclastics** with epiclastics, minor volcanics, and possible intercalated meta-arkoses

Biotitic metasediments: pelitic to psammopelitic gneisses and migmatized equivalents; possibly includes unit Gx mylonitic rocks locally in the Iskwatikan subdomain

Gar — **Psammitic meta-arkose and arkosic wacke**

Gam: interlayered mafic rocks (unit Gm)

Meta-arkose and polymictic meta-arkosic conglomerate (Wapawekka Lake area)

ENNIE LAKE DOMAIN

IAN/APHEBIAN

ocks: intensely flasered, protomylonitic and neisses, cataclasites, tectonic schists and s; mostly early syntectonic and recrystallized

oat Gneisses') - primarily porphyroclastic clase-augen biotite schists and gneisses d from migmatized psammopelitic ediments and derived 'diatexite' melt ths, with minor blastomylonitic gneisses d from varied plutonic protoliths

wiak Gneisses'), Gxh ('Hunter Bay Gneisses') - ily derived from varied megacrystic and gacrystic, quartz dioritic to granitic protoliths, linate porphyroclastic plagioclase-biotite es of 'Guncoat type', may include supracrustal es and schists locally

ite and granite: locally megacrystic, massive bliated plutonic rocks

inor quartz diorite, quartz monzonite: weakly to ted plutonic rocks

diorite

d and refolded granodioritic-granitic gneisses of Allochthon: continuous with unit Lgn of the La n, and probably including extensive areas of econstituted supracrustal and plutonic rocks

onalite to granodioritic gneisses of the Iskwatikan nerally more hornblendic than units Ggl and nction is commonly obscure, zones of migmatite, and later monzogranite bodies, injected by pink granitic neosome

e Iskwatikan subdomain: granodioritic-granitic erally more biotitic than unit Ggl but locally s Ggl, Ggm and Ggd; broadly similar to Lgn wer structural level

matite': agmatite with paleosome of unit Gm; s schlieric granodiorite in many localities

-silicate rock, possibly locally including formed ultramafic rocks

c rocks: amphibolite, hornblende gneiss, sic supracrustals - calc-silicate rocks, ge part derived from basic-intermediate

ks: mainly basalt-andesite lavas, and tuffs

equivalents

ate volcaniclastics with epiclastics, minor possible intercalated meta-arkoses

ments: pelitic to psammopelitic gneisses and uivalents; possibly includes unit Gx s locally in the Iskwatikan subdomain

rkose and arkosic wacke

red mafic rocks (unit Gm)

olymictic meta-arkosic conglomerate ake area)

NEEDLE
Lake
McIntosh
Ntpew Lake
Missinipe
Trout Lake Pluton
Besnard Lake
Morning Lake
Bass
NUMBER 6
CLAM LAKE
Head Lake
English Bay
Nut Bay
Nut Pt
Hines Lake
Lake
Km
0
5
Creighton
Hunter Narrows
HUNTER
Peters I
1193
Stanley Mission
Pinesand
Pipestone
Mayerthorpe
Moose I
Fairholm Bay
Kinoosao
Lgn
Lgm
Lgd
Lgq
Lmg
Rmg
Rm
Rgg
Rgn
Rgq
Rgl
Rgm
Rgd
Rmm
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Rmy
Rmz
Rmu
Rmt
Rmr
Rmo

Ntpew Lake

Missinipe

Otter Rapids

Mountain Lake

Nistowiak L.

Iskwatikan Lake

Nunn Lake

Keg Lake

Moose I

Moysey I

Creighton

Nut Bay

Nut Pt

Hunter Narrows

Peters I

1193

L A C

HUNTER BAY

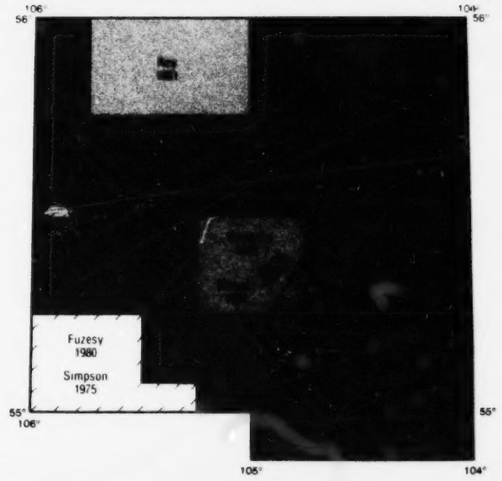
Sample Location (mineral deposit)

1. Rush Lake, "Pie claims". Au (Thomas, 1984; Coombe, 1984)
3. Tamar Showing. Au (Thomas, 1984; Coombe, 1984)
4. Sulphide Lake. Au (As, Zn, Pb, Cu) (Beck, 1959; Forsythe, 1971a; Sibbald, 1984; Coombe, 1984)
5. Preview Lake North and South Zones. Au (Beck, 1959; Forsythe, 1971a; Coombe, 1984)
6. Anglo-Rouyn Mine. Cu (Zn, Pb, Mo, Au, Ag) (Beck, 1959; Forsythe, 1971a; Forsythe, 1972b)
7. Elizabeth Lake. Cu (Zn, Au, Pb) (Forsythe, 1976)
8. Nemeiben Lake. Ni, Cu (Cr, Co) (Beck, 1959; Forsythe, 1971a)
9. Howard (Little Clam) Lake. Ni, Cu, Co (Forsythe, 1972a)
10. Gochager Lake Prospect. Ni-Cu (Co) (Pearson and Froese, 1959; Coombe, 1975)
11. Pitching Lake Prospect. Cu (Beck, 1959; Morris, 1962)

Sample Location (geochronology)

1. 1877 ± 8 Ma. U-Pb zircon (Van Schmus et al., 1985)
2. 1879 ± 66 Ma. U-Pb zircon (Van Schmus et al., 1985)
3. 1659 ± 110 Ma. K-Ar hornblende (Wanless et al., 1974)
4. 1710 Ma. K-Ar muscovite (Lowdon, 1961)
5. 1854 ± 100 Ma. Rb-Sr whole rock isochron (Watters and Armstrong, 1984); location is approximate centre of collecting area
6. 1720 Ma. Pb-Pb galena (Sangster, 1978); different ages result from using differing Pb decay models
7. 1780 ± 90 Ma. K-Ar muscovite; 1820 ± 90 Ma. K-Ar biotite (Money, 1968)
8. 1730 ± 90 Ma. K-Ar muscovite (Money, 1968); 1990 Ma. Rb-Sr whole rock isochron (Money, 1967)
9. 1570 ± 80 Ma. K-Ar biotite (Money, 1968)
10. 1740 ± 90 Ma. K-Ar biotite; 1880 ± 90 Ma. K-Ar hornblende (Money, 1968)
11. 1880 ± 90 Ma. K-Ar hornblende (Money, 1968)
12. 1700 ± 80 Ma. K-Ar biotite (Money, 1968)
13. 1640 Ma. Rb-Sr whole rock isochron (Money, 1967)
14. 1680 Ma. Rb-Sr whole rock isochron (Money, 1967)
15. 1720 Ma. Rb-Sr whole rock isochron (Money, 1967)
16. 1690 Ma. Rb-Sr whole rock isochron (Money, 1967)
17. 1570 Ma. Rb-Sr whole rock isochron (Money, 1967)
18. 1780 Ma. Rb-Sr whole rock isochron (Money, 1967)
19. 2170 Ma. Rb-Sr whole rock isochron (Money, 1967)
20. 2260 Ma. Rb-Sr whole rock isochron (Money, 1967)
21. 2000 Ma. Rb-Sr whole rock isochron (Money, 1967)

SOURCES OF COMPILATION[2]



Saskatchewan Geological Survey 1:100 000 scale reconnaissance mapping

Probably Pre-Wollaston Group ('Sandfly Lake Group' of Money, 1968)

War — **Meta-arkose and pebbly meta-arkose**, including polymict metaconglomerate

Biotite schists and gneisses: medium grained, mesocratic, usually with more than 20 percent biotite + plagioclase + hornblende ± pyroxene + magnetite + quartz; probable volcano-sedimentary origin

ARCHEAN, DEFORMED AND METAMORPHOSED DURING THE HUDSONIAN

Hornblende gneiss-amphibolite: derived from metadiorite-metagabbro unit Wbd

Wbd — **Metadiorite-metagabbro**

Syenogranitic to granodioritic gneisses: biotitic ± hornblende, locally megacrystic, intensely flasered locally, especially adjacent to Needle Falls Shear Zone

Wfm: abundant interlayered amphibolite, possibly related to unit Wvn

ROTTENSTONE DOMAIN

HUDSONIAN

Wathaman Batholith

Rgp — **Monzogranite-granodiorite**: K-feldspar megacrystic to non-megacrystic, ± biotite ± hornblende, medium to coarse grained, massive to foliated, locally containing abundant xenoliths and schlieren of amphibolite and hornblende gneiss

Rgnx — **Augen gneisses**: intensely flasered to protomylonitic, derived from rocks of the Wathaman Batholith adjacent to the Needle Falls Shear Zone

Mixed rocks: weakly foliated rocks of the Wathaman Batholith (unit Rgp) and flasered augen gneisses (unit Rnax) which either predate or are highly deformed equivalents of unit Rgp

Augened monzonitic gneiss: intensely flasered and refolded, predating the Wathaman Batholith (Black Bear Island Lake area)

Tonalite-Migmatite Complex

Rgt — **Monzogranite-granodiorite-leucogranite-(syenogranite)**: local feldspar megacrysts, ± biotite ± hornblende, probably coeval with the Wathaman Batholith, may include metasomatized unit Rgt

Rglx: intensely flasered and augened

Rgt — **Tonalite-trondhjemite** with minor granodiorite, medium to coarse grained, equigranular, massive to strongly foliated, ± garnet ± muscovite, locally containing xenoliths of migmatitic gneiss (unit Rng); possibly of several different ages and possibly in part derived by anatexis of supracrustal paleosome of unit Rng at deeper crustal levels

Rng — **Migmatitic gneiss**: medium to coarse grained, massive to well foliated ± biotite ± garnet ± sillimanite, tonalite-trondhjemite (unit Rgt) and monzogranite-granodiorite (unit Rgp) neosome, and 30 to 90 percent pelitic to psammitic (metagreywacke) gneiss paleosome, with local amphibolite, calc-silicate, meta-arkose; generally containing more neosome to the north

Amphibolite: medium to coarse grained, moderately to intensely foliated; includes coarse-grained, massive to weakly foliated metagabbro-metadiorite

Lqmx: strongly flasered augen gneiss derived from megacrystic quartz monzonite-granite

Lgd — **Quartz diorite-granodiorite-quartz monzonite-granite**: predominantly granodioritic, including relatively homogeneous simple plutons and more complex zoned intrusions in the Central Metavolcanic Belt; may include parts of units Lqm and Lqd

Lqd — **Diorite-quartz diorite-(granodiorite)**: medium to coarse grained, massive to well foliated, ± hornblende ± biotite

Lqdp: porphyritic with feldspar phenocrysts up to 10 mm in diameter

Gabbro-(diorite)

Ultramafic rocks: peridotite, pyroxenite, metagabbro and metamorphosed equivalents (coarse-grained amphibolites, etc.)

Lgn — **Granodiorite-granite complex**: strongly foliated and refolded, predominantly biotitic ± hornblende but locally including hornblende granodiorite-quartz diorite gneiss, mostly plutonic but includes local migmatitic and anatectic components derived from units Lsn and Lm; possibly in large part older than units Lbd, Lqd, Lgd, Lqm (but including these locally) and probably mainly equivalent to, as well as continuous, with unit Ggn in the Wapassini Allochthon, Glennie Lake Domain

Lgdn — **Hornblende quartz diorite to granodiorite gneisses** of the Meraste Zone, locally with abundant amphibolite schlieren and later pink granite/pegmatite neosome; generally more mafic than unit Lgn

PROBABLY APHEBIAN

Amphibolite, hornblende gneiss and schist, with minor calc-silicate gneiss; mainly derived from basic volcanics and volcaniclastics; includes migmatitic rocks with abundant paleosome of unit Lm

Lmx: intensely foliated and laminated derivations of mafic-ultramafic plutons

Basic-intermediate metavolcanics: metalavas, agglomerates, tuffs, epiclastics and proximal volcanogenic metagreywackes; local acid volcanics (unit Lva) and pelitic metasediments (unit Lsn)

Lva — **Acid to intermediate metavolcanics**: metarhyolite, metadacite

Lvs — **Volcanic-volcaniclastic-epiclastic rocks**: includes unit Lvb widely intercalated with epiclastic rocks, metagreywackes and metasediments; gradational to unit Lsn/Msn in places

Lsn — **Biotitic metasediments**: psammitic to pelitic gneiss and schist, ± muscovite + garnet + sillimanite ± graphite ± chlorite; probably mainly volcanogenic metagreywackes, minor metavolcanic and volcaniclastic rocks with local dominant felsic volcaniclastics; unmigmatized to highly migmatized

Polymictic metaconglomerate, with minor intercalated unit Lsn and other supracrustal rocks

MacLean Lake Belt

HUDSONIAN

Red leucogranite: post-tectonic ('Jaysmith Granite')

Red 'quartz-eye' granite: mostly quartz-feldspar granite porphyry but possibly including immature meta-arkosic grits derived from such porphyry (MacKay Lake area)

Albite granite (Bridgemen Lake Pluton)

Granite-granodiorite gneisses

APHEBIAN

Psammitic-psammopelitic metagreywacke: subordinate intercalated pelitic gneiss, hornblende gneiss, calc-

Ggm — to strongly foliated plutonic rocks

Granodiorite, minor quartz diorite, quartz monzonite: weakly to strongly foliated plutonic rocks

Gqd — **Diorite, quartz diorite**

Gabbro-diorite

Ggn — **Strongly foliated and refolded granodioritic-granitic gneisses of the Wapassini Allochthon**: continuous with unit Lgn of the La Ronge Domain, and probably including extensive areas of 'granitized'/reconstituted supracrustal and plutonic rocks

Gdl — **Quartz diorite-tonalite to granodiorite gneisses of the Iskwatikan subdomain**: generally more hornblendic than units Ggl and Ggn, but distinction is commonly obscure; zones of amphibolitic migmatite, and later monzogranite bodies, locally widely injected by pink granitic neosome

Ggl — **Granitoids of the Iskwatikan subdomain**: granodioritic-granitic gneisses, generally more biotitic than unit Gdl but locally including units Gdl, Ggm and Ggd; broadly similar to Lgn and Ggn at lower structural level

Gm — **'Hornblende migmatite'**: agmatite with paleosome of unit Gm, represented as schlieric granodiorite in many localities

Marble and calc-silicate rock, possibly locally including altered and deformed ultramafic rocks

Mafic to mafelsic rocks: amphibolite, hornblende gneiss, mafic to mafelsic supracrustals ± calc-silicate rocks; probably in large part derived from basic-intermediate volcanics

Metavolcanic rocks: mainly basalt-andesite lavas, agglomerates, and tuffs

Gvn: gneissic equivalents

Gve — **Acid to intermediate volcaniclastics** with epiclastics, minor volcanics, and possible intercalated meta-arkoses

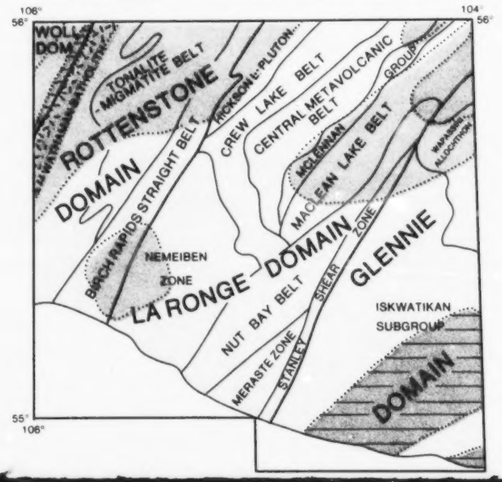
Biotitic metasediments: pelitic to psammopelitic gneisses and migmatized equivalents, possibly includes unit Gx mylonitic rocks locally in the Iskwatikan subdomain

Gar — **Psammitic meta-arkose and arkosic wacke**

Gam: interlayered mafic rocks (unit Gm)

Meta-arkose and polymictic meta-arkosic conglomerate (Wapawekka Lake area)

METAMORPHIC-LITHOSTRUCTURAL DOMAIN MAP



LITHOSTRUCTURAL DOMAINS OF THE PRECAMBRIAN SHIELD IN SASKATCHEWAN

...zonite and granite: locally megacrystic, massive ...ly foliated plutonic rocks

...te, minor quartz diorite, quartz monzonite: weakly to ...foliated plutonic rocks

...artz diorite

...rite

...oliated and refolded granodioritic-granitic gneisses of ...sini Allochthon: continuous with unit Lgn of the La ...omain, and probably including extensive areas of ...d / reconstituted supracrustal and plutonic rocks

...rite-tonalite to granodiorite gneisses of the Iskwatikan ...t: generally more hornblendic than units Ggl and ...distinction is commonly obscure; zones of ...itic migmatite, and later monzogranite bodies, ...dely injected by pink granitic neosome

...of the Iskwatikan subdomain: granodioritic-granitic ... generally more biotitic than unit Gdl but locally ... units Gdl, Ggm and Ggd, broadly similar to Lgn ...at lower structural level

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...afelsic rocks: amphibolite, hornblende gneiss, ...mafelsic supracrustals + calc-silicate rocks, ... in large part derived from basic-intermediate ...s

...ic rocks: mainly basalt-andesite lavas, ...ates, and tuffs

...issic equivalents

...rmediate volcaniclastics with epiclastics, minor ..., and possible intercalated meta-arkoses

...asediments: pelitic to psammopelitic gneisses and ...ed equivalents, possibly includes unit Gx ... rocks locally in the Iskwatikan subdomain

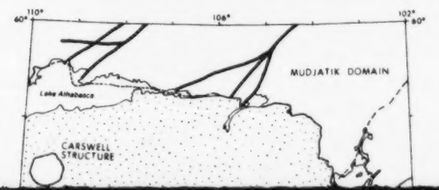
... meta-arkose and arkosic wacke

...erlayered mafic rocks (unit Gm)

...e and polymictic meta-arkosic conglomerate ...kka Lake area)

LITHOSTRUCTURAL DOMAIN MAP

LITHOSTRUCTURAL DOMAINS OF THE PRECAMBRIAN SHIELD IN SASKATCHEWAN



BASE MAP LEGEND

Base map, with acknowledgement, by the Army Survey Establishment, R.C.E. Information depicted current as of 1961. Printed 1964. Interim corrections, 1982.

100,000 M. SQUARE

Horizontal control point ..... ▲

DMEM
DLEL

15 1720 Ma. Rb-Sr whole rock isochron (Money, 1967)
16 1690 Ma. Rb-Sr whole rock isochron (Money, 1967)
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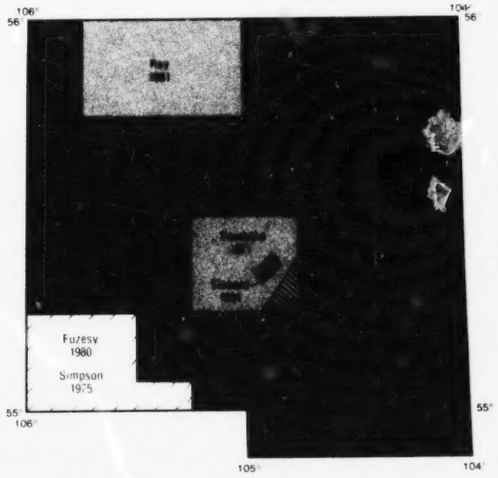

Saskatchewan Geological Survey 1:100 000 scale reconnaissance mapping

Saskatchewan Geological Survey 1:63 360 scale mapping

Saskatchewan Geological Survey 1:50 000 scale mapping

Saskatchewan Geological Survey 1:31 680 scale mapping

Saskatchewan Geological Survey 1:20 000 scale mapping

Saskatchewan Geological Survey Phanerozoic geological studies

[2]For references and annotations see accompanying text.

nt, R.C.E. Information

ROTTENSTONE DOMAIN

HUDSONIAN

Wathaman Batholith

Rgp — **Monzogranite-granodiorite**: K-feldspar megacrystic to non-megacrystic, + biotite + hornblende, medium to coarse grained, massive to foliated, locally containing abundant xenoliths and schlieren of amphibolite and hornblende gneiss

Rgpx — **Augen gneisses**: intensely flasered to protomylonitic, derived from rocks of the Wathaman Batholith adjacent to the Needle Falls Shear Zone

Mixed rocks: weakly foliated rocks of the Wathaman Batholith (unit Rgp) and flasered augen gneisses (unit Rnax) which either predate or are highly deformed equivalents of unit Rgp

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Amphibolite: medium to coarse grained, moderately to intensely foliated, includes coarse-grained, massive to weakly foliated metagabbro-metadiorite

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[1] The term Hudsonian has been used by most authors in Saskatchewan to indicate the tectonometamorphic activity or orogeny which affected Aphebian rocks and older basement during the interval approximately 1900 to 1650 Ma ago (see Douglas, 1980; Bell and Macdonald, 1982)

Lm — **Amphibolite, hornblende gneiss and schist**, with minor calc-silicate gneiss; mainly derived from basic volcanics and volcaniclastics; includes migmatitic rocks with abundant paleosome of unit Lm

Lmx: intensely foliated and laminated derivations of mafic-ultramafic plutons

Basic-intermediate metavolcanics: metalavas, agglomerates, tuffs, epiclastics and proximal volcanogenic metagreywackes; local acid volcanics (unit Lva) and pelitic metasediments (unit Lsn)

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Polymictic metaconglomerate, with minor intercalated unit Lsn and other supracrustal rocks

MacLean Lake Belt

HUDSONIAN

Red leucogranite: post-tectonic ('Jaysmith Granite')

Red 'quartz-eye' granite: mostly quartz-feldspar granite porphyry but possibly including immature meta-arkosic grits derived from such porphyry (MacKay Lake area)

Albite granite (Bridgemen Lake Pluton)

LMgn — **Granite-granodiorite gneisses**

APHEBIAN

Psammitic-psammopelitic metagreywacke: subordinate intercalated pelitic gneiss, hornblende gneiss, calc-silicate and polymictic metaconglomerate; generally garnetiferous ± sillimanite; progressively more highly migmatized (± cordierite) to the northeast

Amphibolite and hornblende gneisses: derived from tuffaceous sediments, volcaniclastics and minor volcanics

Polymictic metaconglomerate and pebbly metagreywacke

'McLennan Group' (and possible equivalents)

LMrg — **'Granitoid meta-arkose'** and anatectic derivatives, ± sillimanite-quartz faserkiesel

LMr — **Layered meta-arkose**: flaggy meta-arkosic wacke, feldspathic quartzite ± faserkiesel; local arkosic metaconglomerate

mafic to mafelsic supracrustals + calc silicate rocks; probably in large part derived from basic-intermediate volcanics

Metavolcanic rocks: mainly basalt-andesite lavas, agglomerates, and tuffs

Gvn: gneissic equivalents

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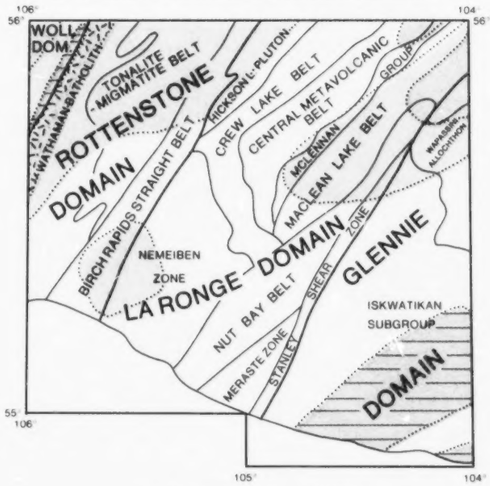
Gam: interlayered mafic rocks (unit Gm)

Meta-arkose and polymictic meta-arkosic conglomerate (Wapawekka Lake area)

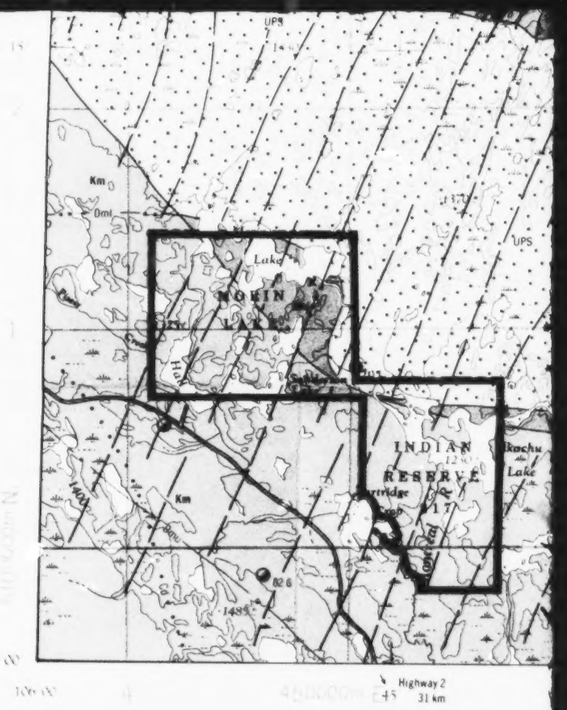
METAMORPHIC-LITHOSTRUCTURAL DOMAIN MAP



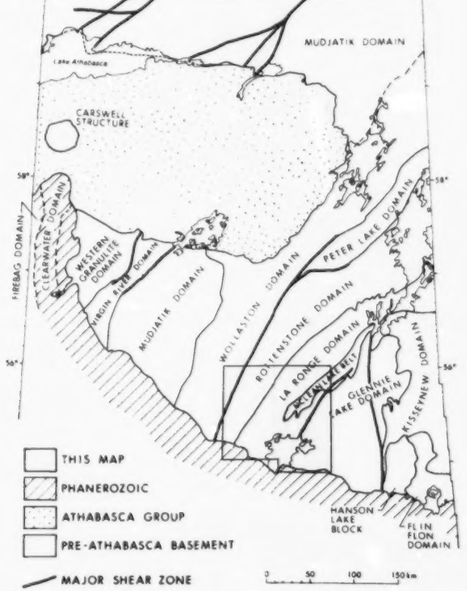
After Rees (1982) and Lewry (1984)

Note: All recorded metamorphic features in this area have been ascribed to one major metamorphic event of Hudsonian age.

Metamorphic Facies	Isograds
Upper amphibolite	cordierite + garnet (muscovite out)
Middle amphibolite	sillimanite
Lower amphibolite	staurolite, cordierite, diopside
Upper greenschist to lower amphibolite (transitional or undivided)	
Upper greenschist	garnet, andalusite
Mainly synorogenic plutonic rocks, regional metamorphic grade undefined	
Unmetamorphosed rocks	



LITHOSTRUCTURAL DOMAINS OF THE PRECAMBRIAN SHIELD IN SASKATCHEWAN



Modified from Lewry and Sibbald (1977) and Macdonald and Broughton (1980)

art derived from basic-intermediate

ainly basalt-andesite lavas,
tuffs

valents

olcaniclastics with epiclastics, minor
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s: pelitic to psammopelitic gneisses and
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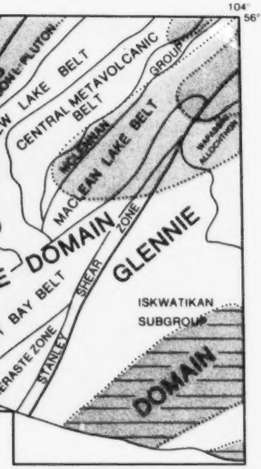
se and arkosic wacke

mafic rocks (unit Gm)

mictic meta-arkosic conglomerate
area)

TRUCTURAL DOMAIN MAP



2) and Lewry (1984)

features in this area have been
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Isograds

..... cordierite+garnet (muscovite out)

..... sillimanite

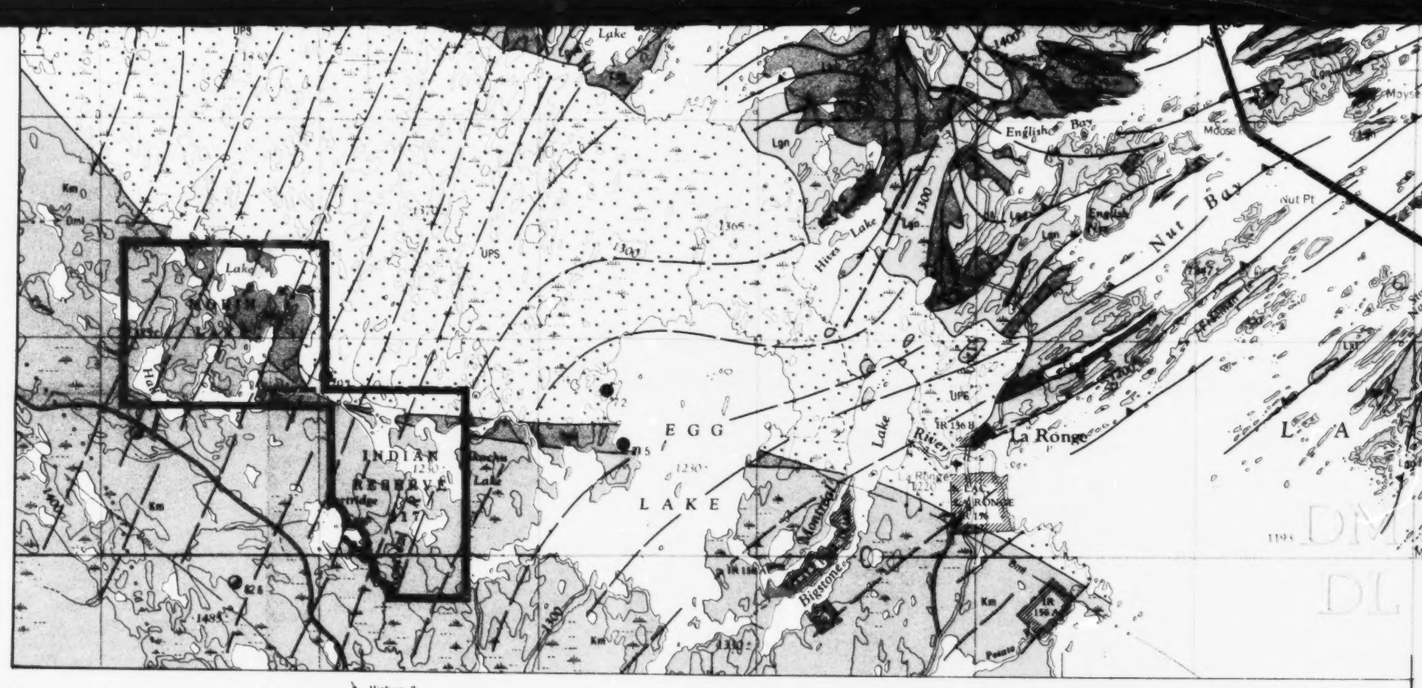
..... staurolite, cordierite, diopside

wer amphibole (transitional or

..... garnet, andalusite

ntonic rocks, regional metamorphic

ks


Lake
English Bay
Moose Pt
Nut Bay
Nut Pt
Hiter Lake
Creighton
Hunter Narrows
HUNTER
Peters I
EGG
LAKE
INDIAN RESERVE
La Ronge
Lake
River
LA RONGE
Meraste Pt
Powdrill Lake
Montreal River
Bigstone
Highway 2
31 km
Km
UPS
Lon
Lom
Lgn
Lam
Lpm
Lcm
Lsm
Lqm
Lbm
Lkm
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Saskatchewan Geological Survey 1:100 000 scale reconnaissance mapping

Saskatchewan Geological Survey 1:63 360 scale mapping

Saskatchewan Geological Survey 1:50 000 scale mapping

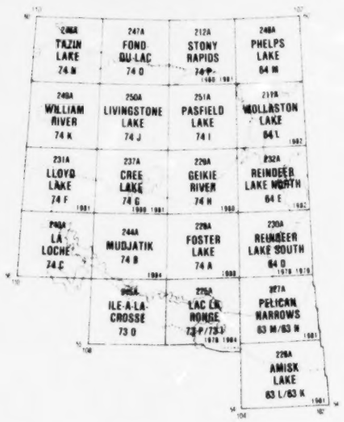
Saskatchewan Geological Survey 1:31 680 scale mapping

Saskatchewan Geological Survey 1:20 000 scale mapping

Saskatchewan Geological Survey Phanerozoic geological studies

For references and annotations see accompanying text

105°00'W 45' 30' 15' 104°00'W


246A TAZIN LAKE 74 N
247A FOND-DU-LAC 74 O
212A STONY RAPIDS 74 P
248A PHELPS LAKE 64 M
249A WILLIAM RIVER 74 K
250A LIVINGSTONE LAKE 74 J
251A PASFIELD LAKE 74 I
219A WOLLASTON LAKE 64 L
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237A CREE LAKE 74 G
229A GEIKIE RIVER 74 H
232A REINDEER LAKE NORTH 64 E
240A LA LOCHE 74 E
244A MUDJATIK 74 B
228A FOSTER LAKE 74 A
230A REINDEER LAKE SOUTH 64 D
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225A LAC LA RONGE 73 P/73 I
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This map

228A — full colour map number
FOSTER LAKE — map title
74 A — NTS area
1980 — year published in preliminary form in Saskatchewan Geological Survey Summary of Investigations

Precambrian geology compiled by J.F. Lewry in 1984/85, following field investigations in 1984. Revisions, Phanerozoic geology and economic geology by W.L. Slimmon, 1985. In-house compilation map by R. Macdonald and W.L. Slimmon, April 1984, and draft compilation map by L.H. Forsythe, May 1979 were consulted.

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Lewry, J.F. and Slimmon, W.L. (1985): Compilation Bedrock Geology, Lac La Ronge, NTS Area 73P/73I, Saskatchewan Energy and Mines, Report 225 (1:250 000 scale map with marginal notes).

Map 225A. Compilation Bedrock Geology Series
LAC LA RONGE, NTS AREA 73P/73I
SASKATCHEWAN
1:250 000 Scale